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# Rearing Lambs on Milk Replacer Diets



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# Rearing Lambs on Milk Replacer Diets

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Ewes are capable of raising twins, and occasionally triplet lambs, but in the United States only 90 percent of lambs are successfully weaned. High lamb mortality during the first few weeks of life is a major contributor to this loss.

Half of this mortality is due to starvation.

Introduction of the prolific Finnsheep breed has increased the number of lambs that starve. This is because the many twins, triplets, and quadruplets born to that breed often can't get enough milk. They are abandoned by the ewes after only a few days.

An effective milk replacement system can save these otherwise orphaned lambs, if they cannot be raised by other ewes with only one lamb.

A flock that contains 25 to 50 percent Finnsheep blood has 20 to 30 percent of its ewes producing triplets and, occasionally, quadruplets.

Hence, for each 100 ewes there is the potential to raise 30 lambs that would otherwise die. Every year, about 800,000 lambs are candidates for artificial milk replacer diets, yet only about 100,000 are raised.

The first step in raising lambs on milk replacer (artificial milk) is to understand that you can do it. Since artificial feeding saves lambs that would otherwise die, you gain the full advantage of multiple births, particularly from Finnsheep cross-bred ewes.

## Using Milk Replacer

You need to arrange for pens, nipples, milk replacer, a feeding system, a washing system (to wash the equipment), and the time to do the required work.

*The milk replacer* is the most significant factor in successful artificial rearing. A high-quality milk

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replacer has the following characteristics:

1. It results in a minimum of digestive disturbance.
2. It has a high level of digestibility and utilization.
3. It is easy to mix.
4. The ingredients stay in suspension.

Use a product with a good reputation; this is not the place to economize. Milk replacers that have been used with the greatest success are composed of the following ingredients, in these proportions: crude fat, 25 percent; protein, 25 percent; lactose, 25 percent; ash, 6 to 7 percent; and fiber, 0.5 percent.

Table 1 shows the composition of a satisfactory lamb milk replacer. Other ingredient combinations may serve equally well if they have high quality and approach the basic composition listed above. Do not attempt to manufacture a milk replacer at home, and *do not use a calf milk replacer*. The fat globules in lamb's milk must be homogenized. Also, the calf milk replacer has far too much lactose, which causes severe scouring (diarrhea), a pot-bellied condition, and high mortality.

Two pounds (0.9 kg) of lamb milk replacer powder per gallon (3.8 L) of

water (1 to 4 parts by weight) results in a milk replacer similar in composition to ewes' milk in total fats and solids. A more concentrated mix (1 to 3.5 parts by weight) may reduce scouring.

Milk replacer powder has a high fat content, and therefore should be mixed in warm water. After it is mixed, the milk should be cooled to 33° to 40° F (1° to 5° C). Rapid cooling is best—it tends to prevent separation of ingredients. Add 1 cc of 37 percent formalin solution per gallon (3.8 L) of milk—this will not harm the lamb, but it will measurably reduce the problem of milk turning sour. It will also reduce frequency of equipment cleaning.

Good milk replacers go into suspension easily, but they do require some mixing. You can mix milk powder and water in a container by hand or you can use a paint mixer blade powered by a  $\frac{1}{4}$ -inch hand drill. Either way, you can easily mix 5 to 10 gallons (20 to 40 L) of milk at a time, and thereby make enough for 50 to 100 lambs.

Mechanical milk mixing machines are available, but with a little ingenuity you can make a satisfactory device from commonly available machinery (such as an agitator-type washing machine).

**Table 1. Example of a milk replacer formula<sup>1</sup>**

Ingredients	Percent
50-50 base <sup>2</sup>	59.5
Sodium caseinate	9.5
Spray-dried skim milk (low-temp)	21.0
Cerelose	9.5
Vitamin-mineral premix <sup>3</sup>	.5
Neomycin <sup>4</sup>	—
Total	100.0

<sup>1</sup>U.S. Sheep Experiment Station, Diet No. 78-0.

<sup>2</sup>The 50-50 base contains 51 percent skim milk, 47 percent choice white grease, and 2 percent soy lecithin emulsifier and is a homogenized, low-temperature, spray-dried product.

<sup>3</sup>Vitamin-mineral premix added contains the following potencies per pound of premix:

Vitamins	
Vitamin A	6,400,000 USP Units
Vitamin D <sub>3</sub>	2,400,000 I.U.
Vitamin E	75 I.U.
Vitamin B <sub>12</sub>	0.88 mg
Riboflavin	2.50 gm
D. Calcium Pantothenate	0.64 gm
Niacin	2.50 gm
Chelated Trace Minerals	Percent
Iodine	0.85
Iron	1.75
Manganese	2.00
Copper	.60
Cobalt	.45
Zinc	2.30

<sup>4</sup>250 grams per ton.

## Equipment

Lambs should feed themselves on a free-choice basis. This minimizes labor and promotes a maximum amount of milk consumed which, in turn, promotes maximum growth. The size and type of milk feeder you need will be determined by the number of lambs you have. The feeder consists of nipples attached to a reservoir which will keep the milk cool and clean, and which is situated to provide easy access for the lambs. Nipples should be not more than 15 inches (0.38 m) above the floor level; a higher level could permit milk to enter the lambs' lungs. Examples of milk self-feeders are shown in figures 1, 2, 3, and 4.

There are two basic types of nipples. The self-primed variety<sup>2</sup> contains a valve and an attached plastic tube (fig. 5). This nipple allows lambs to suck milk with minimum effort, but the valve has a tendency to clog. This restricts the amount of milk the lamb can drink. This type is also difficult to clean.

The other basic type of nipple is called Lam-Bar.<sup>3</sup> This is an easy-to-clean rubber nipple attached to a

plastic tube (fig. 6.)

Both types of nipples should be mounted above the milk level in the reservoir to require the lambs to suck the milk up through the plastic tubes. When the lambs finish sucking, the milk in the tubes flows back into the reservoir, preventing waste. The nipples can be mounted on a metal plate which has baffles alongside each nipple (fig. 7). This effectively prevents lambs from chewing off the nipples.

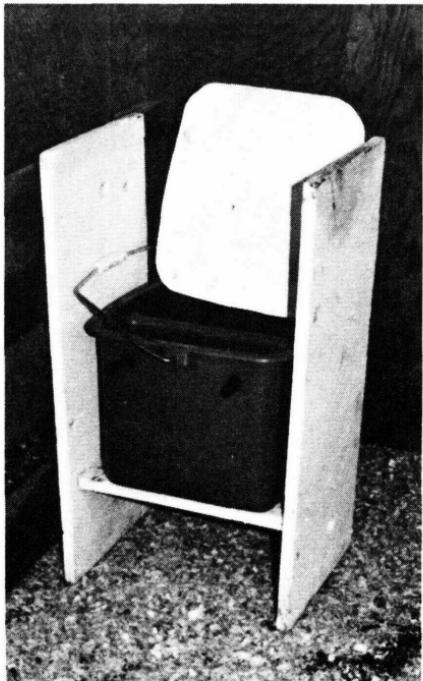
You may use either type of nipple, but there is an advantage in training lambs to suck on the same type of nipple that will be used in the later, self-sufficient stage. Lambs trained to suck on a self-primed nipple and later switched to the Lam-Bar type may refuse to suck.

Use a shallow milk container which keeps the milk near the level of the nipple (fig. 8) while the lambs are being trained to suck. This makes training to suck easier, as the lamb does not have to suck very hard.

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<sup>2</sup>Self-primed nipples available through K & K Mfg. Inc., Rogers, Minn. 55374.

<sup>3</sup>Lam-Bar nipples available through Mid-States Wool Growers Cooperative, 3900 Groves Road, Columbus, Ohio 43227.



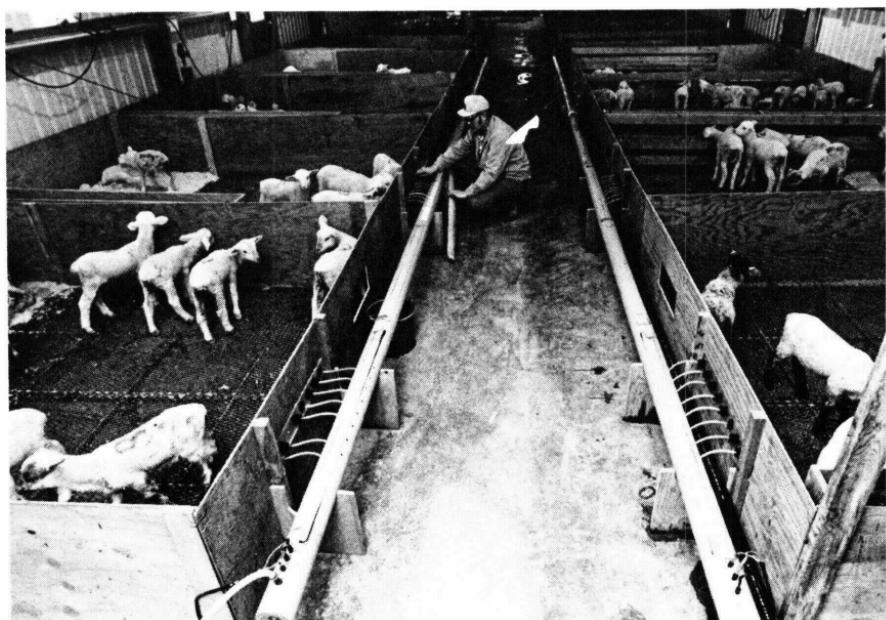
**Figure 1.** Milk replacer self-feeder for six to eight lambs. Consists of two-compartment plastic mop bucket with attached Lam-Bar nipples mounted in plywood frame stand, with a plywood cover.



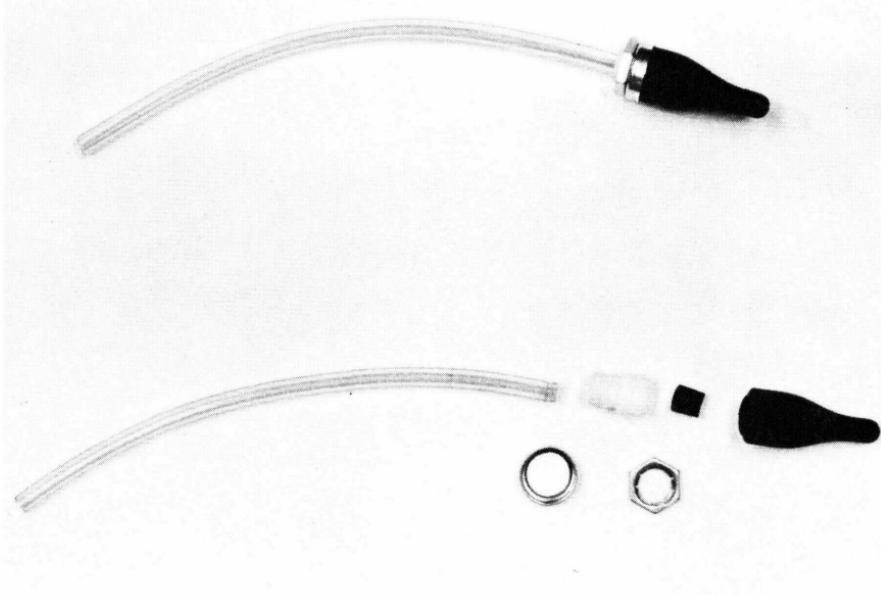
**Figure 2.** Thermo-chest milk replacer self-feeder for 8 to 10 lambs. Lam-Bar nipples are mounted on a metal bar (with baffles), and plastic tubes lead to the milk reservoir. Use of a larger thermo-chest adapts feeders for larger numbers of lambs.



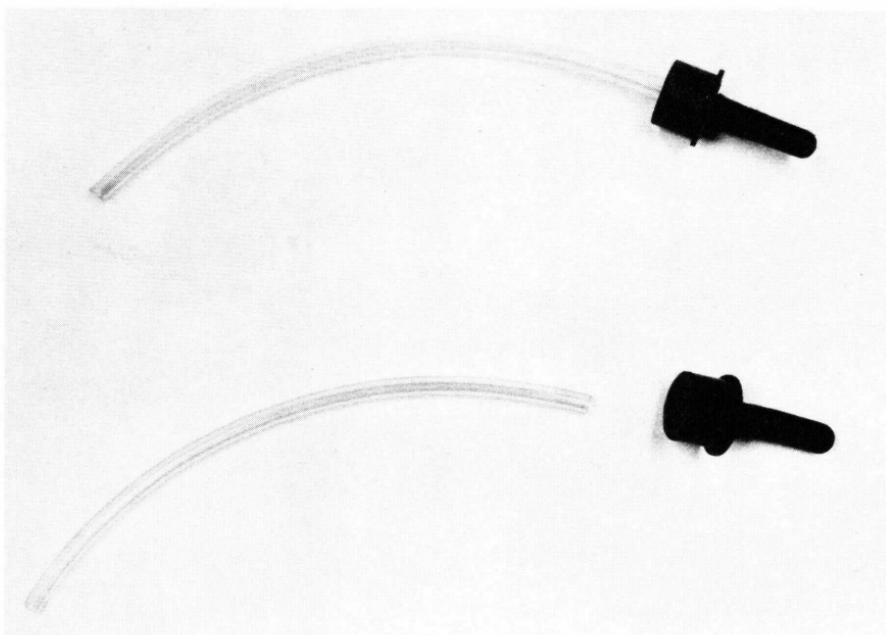
**Figure 3.** Milk replacer self-feeder for up to 50 lambs consists of Lam-Bar nipples and tubes attached to a plastic vat mounted in plywood frame stand. Can be covered with plywood or sheet plastic. Ice jugs are placed in vat to keep milk cold.



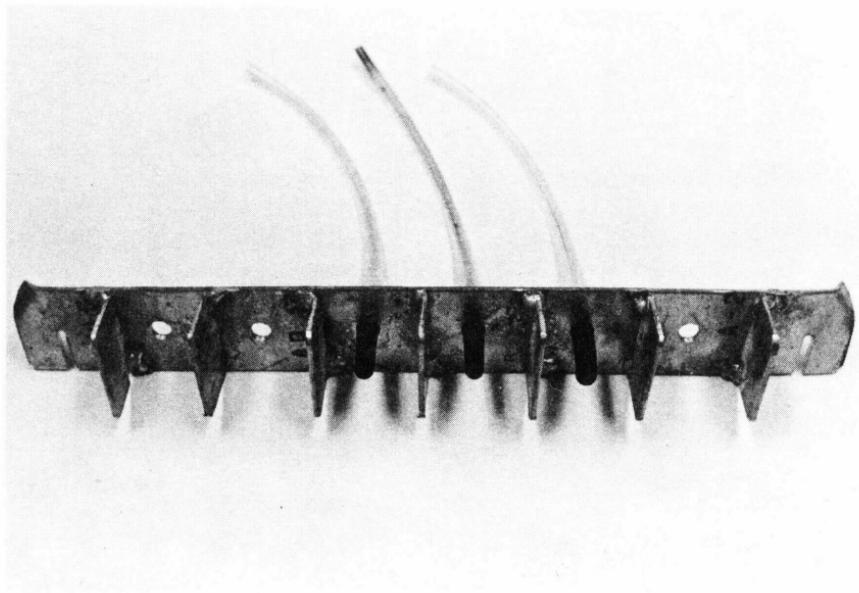
**Figure 4.** Plastic (PVC) pipeline mounted in wooden frame with attached Lam-Bar nipples and tubes. Liquid milk replacer flows to pipeline from refrigerated bulk tank as needed. It is regulated by a liquid level control. Such a unit self-feeds 100 to 180 lambs.



**Figure 5.** Assembled and disassembled view of self-primed nipple which contains a valve



**Figure 6.** Assembled and disassembled view of Lam-Bar nipple and tube.



**Figure 7.** Metal plate for mounting on pen panel to hold Lam-Bar nipples. Baffles prevent lambs from chewing off nipples. Plastic tubes are placed in milk reservoir of feeder unit.



**Figure 8.** Shallow insulated lunch box serves as a milk reservoir for self-feeder with Lam-Bar nipples and tubes. This is used in training lambs to nurse.

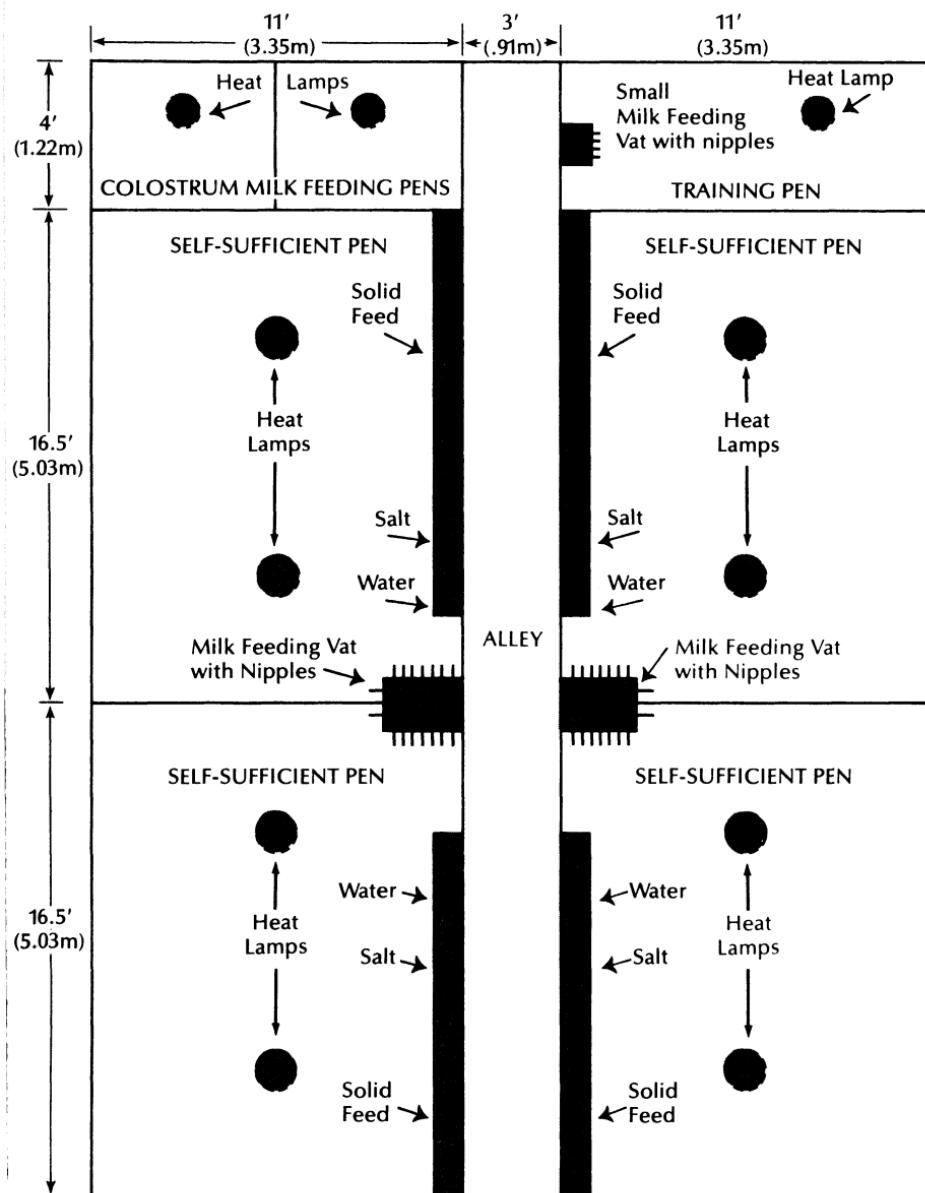


Figure 9. Artificial rearing barn arrangement with four pens (100-head capacity).

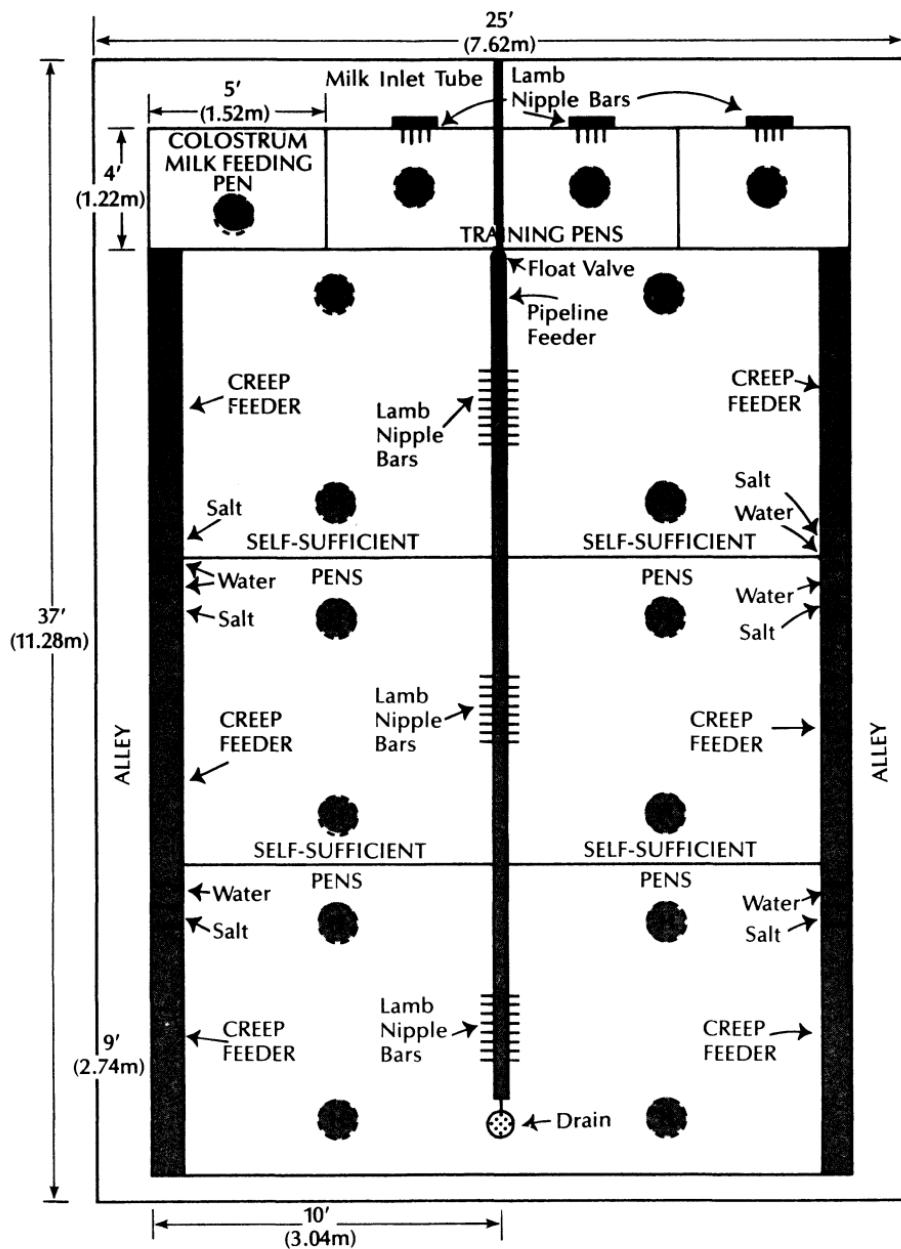


Figure 10. Artificial rearing barn arrangement with six pens (100-head capacity).

## Environment

The season of the year, the number of lambs you want to raise, and your geographical location will determine the housing requirements for lambs during rearing. During fall, winter, and early spring in most climates, lambs will require warm, ventilated, draft-free shelter. Barn temperature is important. In a Minnesota study, for example, lambs housed at 68° F (20° C) gained weight faster, and more efficiently utilized protein and energy than lambs raised at a colder temperature 46° F (8° C).

You can raise lambs on expanded metal floors or on gravel, dirt, or concrete floors. Provide at least 2 square feet (0.19 m<sup>2</sup>) per lamb on expanded metal floors, and 6 to 7 square feet (0.56 to 0.65 m<sup>2</sup>) on bedded solid floors. Provide 1 nipple for each 3 to 5 lambs.

Although you may rear lambs in groups as large as 25, they will perform better if you keep the number in each group down to about 15 or

fewer. And remember, the pen area must be dry and warm. If it is damp or cold, the lambs will huddle together to keep warm, and some of them may die from suffocation. Figures 9 and 10 show feeding pen arrangements at the U.S. Sheep Experiment Station, Dubois, Idaho.

Sheep growers have found that milk temperature is not a critical matter, although most scientific evidence suggests that milk kept at 32° to 40° F (0° to 4° C) reduces spoilage. The colder milk also results in frequent sucking with a small quantity of milk consumed each time. This reduces digestive upsets.

It is important to place water buckets and troughs for dry feed and salt where lambs cannot get their feet into them. This prevents contamination. Place the containers so that the lambs must insert their heads through an opening in the pen panel. This opening should be about 5 to 6 inches wide (12.7 to 15.2 cm) and about 12 to 14 inches (30.5 to 35.6 cm) above the floor (fig. 11).



**Figure 11.** Reach-through type troughs for creep feed during the milk feeding and weaning periods. Feed should be fresh and uncontaminated.

## Selecting Lambs

Within 2 to 4 hours after birth, decide which lambs among those from multiple births you should remove. Look for the weaker, or smaller, ones to choose for artificial rearing. It is important to make this decision early. Relatively weak lambs remaining with the ewes can experience more stress and hazards than those reared artificially.

Occasionally, you may notice a 4- to 6-day-old lamb that shows signs of inadequate feeding. It may look gaunt and smaller than the others, or it may be less active. Even though the lamb has begun normal rearing, remove it from the ewe and start it on milk replacer. It is more difficult to start a lamb on a rubber nipple after it has begun normal rearing, but it can be done. Remove the lamb from the ewe as soon as you see signs that something is wrong. Don't wait until it is hump-backed and beyond help.

## Starting Lambs on the Artificial Rearing Program

It is essential that newborn lambs receive colostrum milk. This milk contains high protein, fat, vitamins, and important antibodies which the female produces for a few days after giving birth. You can make sure lambs get colostrum milk by (1) letting the lamb suckle its dam two or three times, or (2) by giving the newborn lambs colostrum from a supply on hand that came from some of the ewes in the flock, or from a supply of ewes or cow's colostrum that has been frozen. Cow's colostrum has proven adequate for lambs. Frozen colostrum works well after it is thawed at room temperature. Do not heat it, as this will destroy the antibodies. Feed the new-

born lambs three times during the first 12 to 18 hours. Use the same type of nipple that you will use later in the program. Do not hold the lambs in your lap while feeding them. Feed the lambs while they are in a standing position—this will make it easier for them to adjust to the system later.

After feeding the newborn lambs colostrum milk, wait about 4 to 5 hours before starting them on the liquid milk replacer. Don't delay longer as body energy in a newborn lamb may decline to the point where the lamb loses its desire to suck.

If you can, provide a separate pen for lambs learning to suck. This should be equipped with a feeder that allows lambs to suck milk easily (see fig. 8). A piece of sheep pelt tacked to a board mounted just above the nipples is helpful in training.

Use either warm or cold milk replacer while teaching lambs to suckle on the self-feeder. There is an advantage in starting the lambs on milk of the same temperature that will be used throughout the program. Initially, lambs may more readily suck warm milk, but if they are given warm milk at first, they might reject cold milk when they are switched to it later.

You will need to teach the lambs to suck on the rubber nipples. Place the palm of your right hand over the lamb's head with your fingers over the top of its nose. With your third finger, open its mouth far enough to accommodate the nipple. Put your left hand behind the lamb's rump to keep it from backing away. A stool with a V support for the lamb to back into is convenient. After the lamb sucks a few times, the milk will come up through the tubes to the nipple, and then the lamb will suck steadily. You can then remove your

hand from the lamb's head, but keep the lamb at the feeder with your other hand at its rump. You may have to repeat this procedure several times until the lamb appears full.

As much as possible, let lambs suck without assistance. This prevents them from learning to depend on assistance. Most newborn lambs (fed every 6 hours) learn to suck in one or two training sessions. Some, especially those left with the ewe for several days, will require as many as six or eight training sessions. It helps to keep in the training pen one or two young lambs that have already been trained to suck. Their presence will help the others learn.

### **The Self-Sufficient Period**

Once the lambs can nurse without assistance, place them in the pen where they will stay for the re-

mainder of the milk feeding phase. Brand the lamb with a number or other marking, and record the date to determine when to wean them from milk feeding. Do not place very young lambs in the self-sufficient pen together with lambs that are appreciably older. During this period, provide a continuous supply of milk via the self-feeder. Each lamb will drink from 1 to 2 quarts (0.9 to 1.9 liters) of liquid milk replacer [one-half to 1 pound (0.23 to 0.45 kg) of dry milk] per day during this phase. You will probably want to prepare ahead of time at least a 1-day supply of liquid milk replacer and store it under refrigeration until you need it.

After the lambs have been on the milk feeding regimen 1 to 2 weeks, provide them with fresh water and a palatable creep feed (table 2). Also, give them a high-quality, fine-

**Table 2. Composition of a satisfactory mixed grain diet for lambs during the milk feeding and weaning periods<sup>1</sup>**

Ingredient	Percent
Cracked corn	30
Ground oats	25
Soybean oil meal (44% C.P.)	35
Wheat bran	9.5
Trace mineralized salt	.5
Aureomycin or Terramycin	50 g/ton (0.9 t)

<sup>1</sup>At young ages lambs show no preference for pelleted rations or molasses. Keep feed fresh; maximum intake is paramount. Don't grind grain too fine. If high-quality alfalfa is not available, reduce the grain percent and add 20 percent ground alfalfa to the grain mix. Barley wheat or milo could substitute for all or part of the corn with only a modest reduction in lamb performance. The above diet should contain 20-24 percent crude protein.

stemmed alfalfa hay. Even though the amount of creep feed the lambs will eat is very small, it will encourage their rumen development. This is necessary so that the lambs will be able to digest solid feeds when they are 4 to 5 weeks old.

During the milk feeding stage, the lambs will gain 0.5 to 0.7 pound (0.23 to 0.32 kg) daily. They will weigh about as much and be as thrifty and vigorous as the lambs raised with their dams. There are actually fewer deaths among lambs reared artificially than among lambs raised with their dams because there is less chance of accidents or inadequate food supply.

Occasionally some lambs will attempt to suckle on the scrotum or naval of their pen mates. Once lambs develop this habit, they consume little milk, do very poorly, and eventually die. You can usually prevent such problems by properly training the lambs to nurse, insuring a constant milk supply in feeders, properly allocating the lambs (by age) to feeding pens, and by using high-quality milk replacer.

## The Weaning Period

Because of the high cost of milk replacers, you will want to wean lambs to less expensive solid feeds as soon as possible. Research studies have shown that lambs should be weaned abruptly at 4 to 5 weeks, providing they have eaten some solid feed before then. This will largely eliminate abomasal bloat. Don't wean lambs at less than 4 weeks.

A reduced growth rate or "growth check" usually occurs for 7 to 10 days following abrupt weaning. This is caused by the lambs' reduced nutrient intake. A critical change in

their diet takes place at weaning. During the liquid milk replacer stage, the lambs drink milk containing 350 to 500 grams of milk powder daily, and that includes at least 24 percent protein. That diet is very digestible. During the first week after weaning, if the lamb eats about 1.2 pounds (545 g) of feed per day, which contains 17 percent crude protein, it gets only about 93 grams of crude protein. The actual dry feed consumption during the first week after weaning may be considerably less.

Immediately after weaning the lambs, you must do everything possible to encourage them to eat solid feed. They will adjust more readily if you maintain them in the same pen and give them the same kind of solid feed you gave them before weaning. If the lambs eat less than 1.2 pounds (545 g) of dry feed per day, the protein level in their diet will not be sufficient. Make sure that during the first 2 weeks after weaning they get a solid feed diet that provides at least 24 percent crude protein.

Table 3 illustrates the typical pattern of nutrient consumption after weaning. During the first week after weaning (when the lamb is about 5 weeks old), the amount of protein consumed declines about 70 percent. This actually stops the lamb's growth. But during the following week, the lamb should eat enough of the creep feed to receive adequate protein.

## The Post-Weaning Period

You will find that, in most cases, lambs will become adjusted to the solid diet in 7 to 10 days, and their feed consumption will increase to about 1.5 to 2.0 pounds (680 to 900

g) per lamb per day. Now you may combine the lambs into large groups and feed them a diet containing a lower protein level (17 to 18 percent).

The composition of a satisfactory post-weaning diet is presented in table 4. This is a high-energy diet and contains a high proportion of grains, palatable protein supple-

**Table 3. Performance of lambs during the milk feeding period and the first 3 weeks of post-weaning<sup>1</sup>**

Item	Milk feeding		Weaned on dry feed		
	1st 2 wks	2nd 2 wks	5th wk	6th wk	7th wk
Lambs, No.	28	25	25	25	25
Days, No.	14	14	7	7	7
Initial wt., kg	4.8	8.2	12.9	12.7	14.7
Final wt., kg	8.2	12.9	12.7	14.7	17.5
Wt. change, kg	3.4	4.7	−.2	2.0	2.8
ADG, kg	.243	.336	−.029	.286	.400
Daily dry matter intake, g <sup>2</sup>					
Milk powder	244.8	464.4	—	—	—
Creep feed	5.0	27.8	165.8	475.5	853.7
Protein	82.8	116.0	36.3	104.5	187.8

<sup>1</sup>University of Minnesota, 1978.

<sup>2</sup>Milk powder contained 24 percent protein and the creep feed 22 percent protein.

**Table 4. Composition of mixed grain diets for lambs during the post-weaning period<sup>1</sup>**

Ingredient	Percent
Ground oats or corn	50.0
Soybean oil meal (44% C.P.)	20.0
Alfalfa meal	25.0
Animal fat (tallow)	3.0
Dicalcium phosphate	1.0
Ground limestone	.5
Trace mineralized salt	.5
Aureomycin or Terramycin	2.5 g/100 lb (45.4 kg)
Vitamin A	5,000 I.U. lb. (0.45 kg)

<sup>1</sup>Example rations only. Animal fat is optional. The lambs need energy and at least 15 percent protein. The added limestone will minimize urinary calculi problems. Pelleting this diet would increase intake after the lambs are 6 to 8 weeks old and reduce the sheepman's labor. The above diet should contain 17-19 percent crude protein.

ment, adequate minerals, and an antibiotic.

There are two ways to fatten lambs. One is to continue the lambs on grain in dry lot. When the lambs are about 10 weeks old, and weigh about 45 to 50 pounds (20 to 23 kg), increase the roughage level in their diet to 50 percent for the remainder of their fattening period. The second method is to use exceptionally high-quality pasture, free from parasites, during the post-weaning period.

## **Labor**

If you raise 20 or more lambs, your labor should not exceed more than 1 or 2 hours per lamb during the 4-week milk feeding period. When you add the formalin solution to preserve your milk, you will minimize the amount of time you will spend in washing and cleaning your equipment. Usually, cleaning once or twice a week is adequate. You will find that mixing 5 to 10 gallons (19 to 38 L) of milk takes only a few minutes and, once the lambs are weaned, labor for feeding is the same as for lambs weaned from the ewe.

## **Health**

Artificially reared lambs are subject to the same disease and health problems as lambs reared normally.

These include enterotoxemia, scours, coccidiosis, bloat, pneumonia, enteritis, white muscle disease, fly-strike, and others. By all means, vaccinate lambs against enterotoxemia and white muscle disease. The U.S. Sheep Experiment Station vaccinates on day 1, 10, and 30 with *Clostridium perfringens* type C-D toxoid.

Minnesota data suggest that artificially reared lambs are highly susceptible to internal parasites and fly strike when they are turned out to pasture. Hence, if you can, feed your lambs in a dry lot. If you must turn them out to pasture, the pasture should be of exceptionally high quality and free of parasite larvae. Artificially reared lambs should not be mixed with other sheep or lambs that have been on pasture.

## **Results**

Table 5 summarizes the expected growth rate and feed consumption for lambs raised according to the information in this publication: Lambs are on artificial milk feeding plus creep feed for 4 weeks, are continued on creep feed for about 1 week, are self-fed a high energy protein post-weaning diet about 5 weeks, and are finished on a high roughage fattening diet. Using a higher grain ration could result in more rapid gains during finishing.

**Table 5. Average per lamb weight gains, feed consumption, and feed efficiency of lambs reared artificially from birth to slaughter weight in drylot<sup>1</sup>**

Item	Milk feeding period	Post-weaning period <sup>2</sup>		Fattening period
		weaning period <sup>2</sup>		
Days on period	28	39		99
Initial weight (lb) (454 g)	9.6	24.4		45.8
Final weight (lb) (454 g)	24.4	45.8		99.5
Total weight gain (lb) (454 g)	14.8	21.4		53.7
Daily gain (lb) (454 g)	.53	.55		.55
Daily feed consumption: (lb) (454 g)				
Milk replacer powder	.70	—		—
Chopped alfalfa (sun-cured)	.02	.1		—
Pellets (diet 74-4)	.03	1.6		—
Pellets (37.5% bar. -62.5% alf.)	—	—		3.4
TOTALS	.75	1.7		3.4
Total feed consumption: (lb) (454 g)				
Milk replacer powder	19.6	—		—
Chopped alfalfa (sun-cured)	.6	.7		—
Pellets (diet 74-4)	.8	62.4		—
Pellets (37.5% bar. -62.5% alf.)	—	—		336.6
TOTALS	21.0	63.1		336.6
Feed required per round gain: (lb) (454 g)				
Milk replacer powder	1.32	—		—
Chopped alfalfa (sun-cured)	.04	.03		—
Pellets (diet 74-4)	.05	2.92		—
Pellets (37.5% bar. -62.5% alf.)	—	—		6.27
TOTALS	1.41	2.95		6.27

<sup>1</sup>U.S. Sheep Experiment Station.

<sup>2</sup>Includes 7-day weaning period.

## **Profit and Loss With Artificially Reared Lambs**

Rearing orphaned lambs is profitable. Letting them die means wasting some of the money every sheep grower spends on an operation. Recognize that at the time a lamb is born, you have already spent about 70 percent of the cost of producing a fat lamb—on ewe, feed, facilities, and depreciation. If you do not save all of the lambs that are born, your net return will be markedly reduced.

Milk replacer powder costs have fluctuated between 40 and 60 cents per pound (88 cents and \$1.32 per kg) during the last few years. Even at 60 cents per pound (\$1.32 per kg),

with 20 pounds (9 kg) of milk powder consumed per lamb, milk replacer costs amount to only about \$12.00. This cost, plus inexpensive equipment and 1 to 2 hours of labor per lamb, is your total investment in each lamb at the time it is weaned. It should then weigh about 22 to 26 pounds (10 to 12 kg). At this point, lambs begin to eat grains and forages which are priced far below milk replacer.

Table 6 shows a breakdown of costs per lamb from the time milk feeding is begun until the lamb is of slaughter weight. Assuming that lambs sell for \$55 to \$65 per hundredweight, you can make a profit of about \$20 to \$35 per lamb.

**Table 6. Feed and vaccination costs of artificial rearing of lambs, birth to slaughter weight (dry lot), U.S. Sheep Experiment Station, 1978**

Item	Costs Per Lamb
<i>Milk feeding period</i>	
Milk replacer powder	(19.6 lb x .55 <sup>c</sup> )
Chopped alfalfa	(0.6 lb x 2.5 <sup>c</sup> )
Pellets	(0.8 lb x 7.0 <sup>c</sup> )
<b>TOTAL</b>	<b>.06</b>
Feed cost per pound gain = 73.4 <sup>c</sup>	10.86
<i>Post-weaning period<sup>1</sup></i>	
Chopped alfalfa	(0.7 lb x 2.5 <sup>c</sup> )
Pellets	(62.4 lb x 7.0 <sup>c</sup> )
<b>TOTAL</b>	<b>.437</b>
Feed cost per pound gain = 20.5 <sup>c</sup>	4.39
<i>Fattening period</i>	
Pellets (37.5% bar. -62.5% alf.)	(336.6 lb x 5 <sup>c</sup> )
Feed cost per pound gain = 31.3 <sup>c</sup>	16.83
<b>TOTAL FEED COST</b>	<b>32.08</b>
<i>Vaccination costs</i>	
Selenium-Tocopherol	(1 cc x 15 <sup>c</sup> )
Clostridium Perfringens, Type C-D	
Toxoid	(6 cc x 10 <sup>c</sup> )
<b>TOTAL VACCINATION COST</b>	<b>.75</b>
<b>TOTAL FEED AND VACCINATION COSTS PER LAMB</b>	<b>\$ 32.83</b>

<sup>1</sup>Includes 7-day weaning period.

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